

ABSTRACT

A slurry for chemical mechanical polishing (CMP) of a refractory metal based barrier film includes a plurality of composite particles and at least one selective adsorption additive, such as a surfactant or a polymer. The composite particles have an inorganic core surrounded by the selective adsorption additive. The refractory metal based barrier film does not substantially adsorb the selective adsorption additive surfactant, while other exposed films substantially adsorb the surfactant. A method for chemical mechanical polishing (CMP) a refractory metal based barrier film includes the steps of providing a slurry including a plurality of composite particles and at least one selective adsorption additive. The invention can be used for a single step CMP process for polishing a structure including a gate or interconnect metal layer, a refractory metal based barrier film and a dielectric film, first removing gate or interconnect overburden metal and then removing the overburden regions of the refractory metal based barrier film in a single polishing step.